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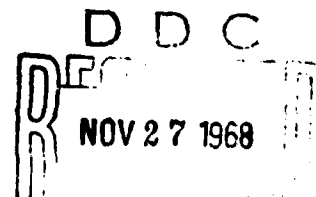
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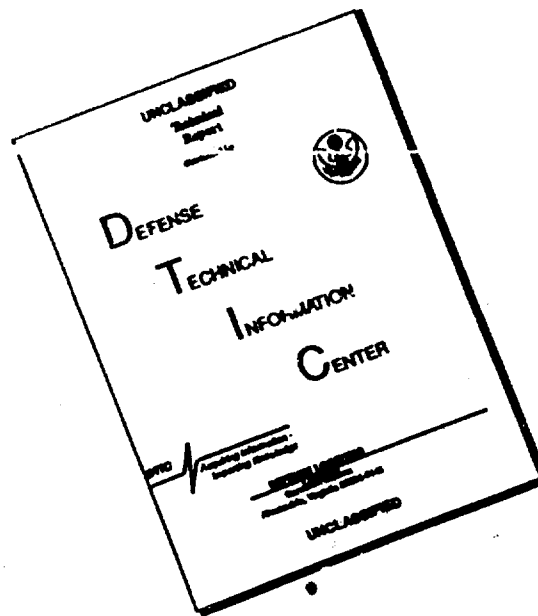
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## PEANUT

Sel'khozgiz (State Publ. House for Agriculture), Moscow-Leningrad, 1954, pages 1-4, 123-133

Z. A. Luzina

The book describes in detail the techniques of cultivation of the peanut on the basis of the experience of agricultural pace-setters and scientific-research establishments.

The book elucidates the economic significance, chemical composition, botanical characteristics and biological properties of the peanut.

The selection and seed breeding of the peanut are described in adequate detail, along with a description of varietal zoning.

The book is designed for agronomists.

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## PREFACE

The 19th Party Congress in its Directives for the 1951-1955 Five-Year Plan for the Development of the USSR National Economy named the further increase in the yields of every crop as one of the major tasks of agriculture.

The September Plenum of the CC CPSU in its Resolution, "Concerning Measures to Further Develop the Agriculture of the USSR," outlined concrete ways and means of raising crop yields. The resolution imposes, in particular, the obligation of assuring a high level of agricultural engineering and introducing into production new, high-oil, early-maturing, high-yield and disease-resistant varieties of oleaginous crops.

The peanut is a valuable oleaginous crop. Owing to its economic value and varied uses, the peanut is of great significance to our nation's economy. The seeds of the peanut contain as much as 61 percent fat and as much as 34 percent protein. In addition to being a valuable foodstuff, the seeds of the peanut display high gustatory qualities.

The oil of the peanut displays gustatory qualities which put it in the class of high-value edible oils, and it finds broad use in the confectionery, canning and margarine industry.

The proteins of the peanut are full-value, readily assimilated and contain all the principal amino acids necessary to life.

The oil-cake obtained during industrial processing of the peanut into oil is a valuable high-protein product used for food and fodder purposes.

As a leguminous plant, the peanut, when cultivated with sophisticated farming techniques, is a good predecessor of many crops. Decumbent forms of the peanut may be used as green manure and as a valuable fodder crop.

Agricultural pace-setters attain high yields of the peanut when using domestic varieties adapted to various soil-climatic zones and employing sophisticated farming techniques.

Thus, a crew member of the Kolkhoz imeni A. A. Zhdanov, Karasuyskiy Rayon, Tashkentskaya Oblast, Comrade Mirkhaydar Abidov, is harvesting 39-40 centners of the peanut per hectare.

The principal peanut growing areas are in the humidified zone of the North Caucasus and in the irrigation farming zone of the Uzbek, Tadzhik and, partly, Kirgiz SSRs. In addition, the peanut is grown on a very few areas in the southern regions of the Ukrainian SSR.

The book describes the techniques of cultivation, selection and seed growing of the peanut on the basis of long-time experimental studies by scientific-research institutions and experimental and selection stations and the author herself, as well as on the basis of the experience of foremost agricultural people in attaining high yields of the peanut.

It is requested that any comments and suggestions be mailed to the Sel'khozgiz in Leningrad at Nevskiy Prospekt, 28.

## DISEASES AND PESTS

### Diseases

Botrytis rot (Botrytis cinerea Pers.). Fungal disease. Externally it manifests itself in the rapid withering of all or part of the affected plants. The rotting of the bush or its individual branches commences at the base and spreads upward. The withered leaves retain their green color instead of becoming brown. From the stalks the rot usually spreads to the pods, whose coat then gets covered with a black leathery sclerotic film; the pods grow dark and the seeds acquire an intensely bitter taste. Botrytis rot attacks the peanut at the end of the vegetation season, particularly when the autumn is cold and rainy.

Countermeasures. Proper crop rotation and deep fall plowing; thorough destruction of diseased plants and harvest residues; planting with seeds from healthy plants.

Fusarial head blight (Fusarium sp.). In the presence of this disease, the tissue of peanut stalks near the root neck acquires a brown color and, subsequently, particularly in wet weather, there appear pale-pink blotches -- the mycelium of the parasite. The foliage of the diseased plants grows yellow, sere and twisted and is shedded. The affected plants die.

Countermeasures. Proper crop rotation, planting with healthy seeds on using sophisticated farming techniques, densification of planting up to the maximum limit and pickling of seeds in ethyl mercuric chloride prior to planting.

Verticilliosis (Verticillium albo-atrum Reinke). This disease strikes the vascular system of the roots, thus causing the gradual death of foliage and subsequently of the entire plant. In the diseased plants, the leaves grow brown at the edges, die and fall. The affected plants remain alive until the harvest and bear fruit, but the pods are underdeveloped and the seeds are infected with the causative agent of this disease. The disease is transmitted through the soil, plant residues and affected seeds.

Countermeasures. Proper crop rotation, thorough destruction of post-harvest residues and planting with seeds of healthy plants.

Peanut blight (Sclerotium Rolfsii Sacc.). This is a fungal disease that is chiefly common in the humid subtropical zone. The initial symptom of the blight is the withering of

the lower sections of the branches. As the disease develops, the affected plant dies part by part and withers. The lower leaves wilt and lose their green coloration. Subsequently, the lower part of the stalk, the foliage, roots and pods decay, become brown and coated with a thick white layer of densely intertwined mycelium which forms on the surface of the injured organs spherical (millet grain-sized) sclerotia varying in color from pale-yellow and yellowish to dark brown. The mycelium also penetrates the soil around the injured plant.

Countermeasures. Deep plowing with a skim coulter-equipped plow, planting with healthy seeds, assurance of a maximum -- within the technically permissible limits -- nutrition area for optimum aeration, thorough weeding of the planted area and loosening of the soil.

Mosaic disease of foliage. The yellows or the mosaic disease of foliage is a viral disease, highly dangerous to the peanut, since the stricken plants cease to bear fruit. The earlier this disease strikes the plants the greater the decline in yields is. The stricken plants are dwarfed in size owing to the rapid foreshortening of their shoots. The young top leaves are mosaic-streaked and curled. The edges of the old leaves acquire a bright-yellow color. Flowering in these plants continues but fruit bearing ceases.

Countermeasures. Not developed yet.

#### Pests

Spider mite (Epitetranychus sp.). Extremely tiny, barely perceptible spider about 0.3-0.4 mm long, which winters in the surface layer of soil above the plant residues. In the spring it deposits eggs on the lower surface of foliage. Growth cycle is extremely short and in southern regions there may be as many as 10-15 generations during a single vegetation season.

This mite appears on the peanut toward the end of the vegetation period, in July-August and, by draining the juices of the leaves, damages the plant markedly. On the contaminated plants, the surface of foliage gets covered with tiny white spots and the underside of the leaves is covered with tiny spider webs. The leaves grow yellow and sere. The damage inflicted by this mite results in disturbances to the normal functioning of the plant and in a sharp decline in yields. This damage is particularly great during periods of drought.

Countermeasures. Fall plowing, weeding with immediate removal of weeds. On irrigated lands: the proper regime of

irrigation. During the early period of growth of the mite on the plants, the leaves should be sprayed at top and on the underside with pulverized sulfur mixed with slaked lime in the ratio of 1:2, at the rate of 30 kg of sulfur per hectare, or with sulfur concentrate in the amount of 40-60 kg per hectare. The spraying is repeated in 10-12 days until complete destruction of the mite, but not less than three times. For combined spraying against the mite and cotton-ball worm, use is made of a mixture of sulfur and DDT or hexachloran in a mutual ratio of 1:1, at the rate of 30-40 kg per hectare, or one part of DDT or hexachloran to two parts of sulfur, at the rate of 60 kg per hectare.

Cotton-ball worm (*Clorella obsoleta* F.). A brownish-yellow butterfly, harmful when in the form of caterpillars of various coloration -- greenish, yellowish-pink, violet-hued -- up to 40 mm long. The butterflies vary in color from light-brown to dark-brown and they deposit eggs on various parts of cultivated plants and weeds. The caterpillars hatched from these eggs initially feed on the part of the plant in which the eggs had been deposited but subsequently they feed chiefly on the generative organs, and flower buds. In the peanut, the cotton-ball worm damages chiefly the foliage. In the course of a single summer it gives several generations. It is particularly harmful in the Southern European USSR (where two to three generations develop during the summer) and in the Transcaucasus (three to four generations) and Central Asia (four to five generations).

Countermeasures. Deep fall plowing, early planting, destruction of weeds, inter-row tilling of soil. In the season of early deposition of eggs by the moths, the plants are sprayed with calcium arsenate (10-12 kg/hectare) in a mixture with road dust in the ratio of 1:1. The spraying is repeated five days afterward and subsequently as needed. To combat the young caterpillars, the plants are sprayed with 5% DDT dust (20-40 kg/hectare). Subsequently, poisoned bait is used against the caterpillars. The bait is prepared as follows: for each 10 kg of oil-cake wetted with three to four liters of water, take one of the following poisons: DDT, 1 kg or hexachloran dust, 500-600 g; calcium arsenate, 500 g; sodium arsenate, 200 kg/sodium fluosilicate, 800 g. The bait can also be dry. It is scattered over the surface of the most contaminated top leaves and tops of the plants. The bait is expended at the rate of 40-60 kg per hectare and is used until three to four weeks prior to the commencement of the harvest. The contaminated areas are separated with gutters at whose bottom the bait is placed.

Alfalfa worm (*Clorella dipsacea* L.). The caterpillars have eight pairs of legs and varying, mostly bright-green (but

also darker and pink) coloration. Their body is covered with dark spots and their dorsal part, with alternating bright and dark spots. The caterpillars chiefly eat the leaves, on first boring holes in them and then reducing them to skeletons and eating them completely. Subsequently, the caterpillars also may harm the generative organs. During summer in the South, there occur two generations of the alfalfa worm. This worm winters in the soil in the form of a pupa. It occurs widely except in the Far North. It is particularly harmful in the Central and Southern Zones of the European USSR.



Fig. 15. The Alfalfa Worm: Butterfly and Caterpillar.

Countermeasures. Deep fall plowing with a skim coulter-equipped plow, inter-row cultivation of soil so as to produce adverse conditions for the pupating caterpillars and the pupas, weeding, early and rapid harvesting and threshing of pods. In the event of a mass outbreak of caterpillars, spraying or dusting with the intrinsic-action poisons used to control the cotton-ball worm.

Beet armyworm (*Laphygma exiqua* Hb.). A small butterfly with grayish-brown fore-wings. Widespread in the Southern USSR. Harms a number of crops, including the peanut, particularly in the republics of Central Asia and the Transcaucasus. Color of caterpillars: bright-green to dark-green. Adult caterpillars are up to 27 mm long. Three sinuous stripes run along the body (central stripe is narrow). The caterpillars feed chiefly on leaves and secondarily on buds and flowers. Pupation occurs in soil at a depth of 5-10 cm. The beet armyworm gives several generations in the course of a year: two to three in the North Caucasus and as many as six in Central Asia. The first generation in the spring develops on plantings of alfalfa and clover.

Countermeasures. Deep fall plowing, inter-row cultivation of soil (during the mass pupation period), systematic weeding with immediate removal of weeds from the field. Spraying and dusting with intrinsic-action poisons (the same as used to control the cotton-ball worm) during the period when the caterpillars concentrate en masse on alfalfa plants, placement of poisoned bait (early at dawn or in the evening) to catch the older caterpillars.

Beet webworm (*Laxostegia sticticalis* L.). The caterpillars of this butterfly damage all the oleaginous crops. The adult caterpillar of the beet webworm winters in the topsoil in



elongated cocoons of dense spiderweb fabric. In the spring the caterpillars pupate and in May or early June the pupas become transformed into tiny butterflies which fly in the morning and evening hours, feeding on flower nectar. The butterflies deposit eggs on the leaves of cultivated plants and also on weed shoots and on dry plant residues. Five to ten days later the eggs get hatched into caterpillars which eat the tender parts of the leaf (the parenchyma); the older caterpillars eat the entire tissue of the leaves, leaving untouched only the larger veins. The adult caterpillars often migrate from one plant to another and sometimes crawl over en masse from one sector to another. In the years of their mass reproduction they entirely destroy the plants. There are several generations in the course of a year: in the South, given favorable conditions, there occur three to four generations of this webworm.



Fig. 16. Beet Webworm: Butterfly; Butterfly with the Wings Folded; Caterpillar; Cocoons in Soil.

Countermeasures. Deep fall and spring plowing; thorough weeding prior to the season of emergence of the butterflies, with immediate removal of weeds from the field and their burning; release of trichogramma during the season of egg deposition; inter-row loosening of the soil during the season of mass pupation of the caterpillars.

Spraying of caterpillar-contaminated weeds on untilled lands with barium chloride, sodium chloride (8-10 kg/hectare), dusting with sodium fluosilicate, calcium arsenate, DDT (3-5 kg/ha in a mixture with road dust in the ratio of 1:2). The plantings are dusted with the same poisons as are used to control the caterpillars of the alfalfa worm, the cotton-ball worm, the beet armyworm, and other worms. To prevent mass migration of caterpillars to uncontaminated planted fields, protective gutters are excavated around these fields and filled with poisoned bait such as the foliage of broad-leaved weeds, alfalfa, clover soaked in a solution of sodium arsenate (50-80 g of poison per 10 kg of bait) or sodium fluoride (300 g of poison per 10 kg of bait) dissolved in three liters of water.

Wireworms (family Elateridae, genus Agriotes). The wireworms represent yellow and hard larvae of the click beetles. They live in the soil. The larvae of various species of this beetle grow for from two to five years, and hence they harm the peanut throughout the vegetation season. They eat the seeds planted in the soil and later they eat the stalk entirely or partly. The affected plants grow yellow and sere. These larvae

cause particularly great harm to new-crop pods by penetrating the pod covering and eating the growing seeds, thus reducing or completely destroying the harvest.

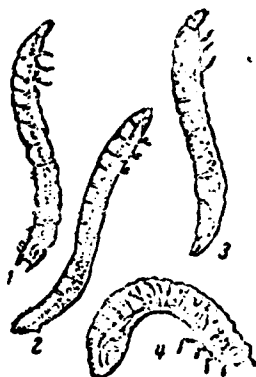


Fig. 17. Beetle Larvae Damaging the Peanut in the Soil: 1, 2 -- Wireworms (click beetles); 3 -- False wireworm (nocturnal ground beetle); 4 -- Cockchafer.

**Countermeasures.** Proper crop rotation, fall plowing, inter-row cultivation during the season of pupation of the larvae. To combat wireworms, a 25% mixture of hexachloran with manufactured phosphorite meal is applied to the soil in the amount of (per hectare): 40-60 kg for loamy soils; 100-140 kg for peat-bog soils; and 40 kg for sandy soils. When this mixture is not available, 12% hexachloran dust is applied to the soil instead, in the amount of 83 kg per hectare. The poisoning of the soil with hexachloran, which influences the taste of the harvested crops, is best carried out in a fallow field. The preparation is scattered on the soil surface and, owing to subsequent cultivation, imbedded to a depth of 6-10 cm. Hexachloran may also be applied by the hill-check

method. To protect the shoots against damage by the wireworm, the dusting of seeds with hexachloran prior to planting is recommended.

Larvae of the nocturnal ground beetles (fam. Tenebrionidae). These larvae are cylindrical (flatter at bottom side), of dark-brown color. Their caudal segment is sharp tipped and spiny. They damage the shoots, sometimes causing the death of plants over considerable areas. The larvae of various species of these beetles develop over periods of from two (sand beetle, *Opatrum sabulosum*) to fifteen (steppe beetle, *Blapa halophila*) months.

**Countermeasures.** Poisoned bait, spraying and dusting with poisons, gutters with catch-basins, etc. The bait is made of bran, sunflower oil-cake, barley or corn chaff to which is added (2-2.5% by weight) sodium arsenate or Paris green along with a sufficient amount of water to cause the bait, during its strewing, to scatter into small nodules. The bait is strewn before and after planting and also sometimes over the rows of shoots, or it is placed under bunches of grass or straw in a chessboard pattern once every 6-10 m. Where weeds grow,

hexachloran-treated green bait of freshly cut leaves of nettle, burdock, plantain, etc., is applied. The green bait is lightly wetted with water and then dusted with 12% hexachloran dust at the rate of 400 g per 10 kg of bait. One hundred clumps of bait weighing 150-200 g each are strewn over a hectare. The bait also is treated with 9% solution of sodium fluosilicate or sodium arsenate (50-80 g per 10 liters of water). Contaminated sectors are sprayed with DDT or hexachloran (15-20 kg/hectare), calcium arsenate (8 kg/hectare in pure form or in a mixture with road dust in the ratio of 1:1). Plantings are sprayed with barium chloride (400-500 g per 10 liters of water; 500 liters per hectare).

Larvae of lamellicorn beetles (fam. Scarabaeidae). Large arc-shaped larvae, white or gray, with a dark head and with three pairs of legs in the anterior segments of the body. Their trunk is thick, meaty with numerous transverse folds. The larvae inhabit the soil and damage the root system and lower part of the stalk.

Countermeasures. Fall plowing, inter-row cultivation. On the strongly contaminated sectors, the soil is treated with chlorobenzene, hydrogen sulfide, chloropicrin (according to special instructions). Certain species of these beetles may moreover be trapped in trenches dug along the field boundaries.

Cockchafers and summer chafers (Melolontha L.). The larvae of these chafers damage the subsoil parts of plants, causing their decay.

Countermeasures. To control the chafers, like the other wireworms, the soil is treated with hexachloran, or poisoned bait is applied to the soil during pre-planting cultivation or later -- in the inter-rows. The bait is made of corn chaff: three or four parts of sodium arsenate are taken per 100 parts of the chaff and boiled until the mixture is soft. Twenty to 25 kg of bait are used per hectare. In addition, boxes with bait are deployed.

Bean-seed fly (Hylemyia ciliocrura Rond.). The fly larva reaches 4-5 mm in length, is yellowish or muddy-white in color, broadening at the end. The larva inhabits the soil and eats the shoots, destroying the apical point and eating the seed-lobes, thus resulting in the weakening and partial destruction of the shoots.

Countermeasures. Early planting.

Ants (Formica). They are major pests of the peanut, damaging the seed-lobes of the planted seeds and sometimes also

the embryos. The damage to the germinating seeds results in their decay and death. Moreover, ants also damage the fruits of the peanut by boring holes in the envelope of the fruit and in the fruit itself, with subsequent destruction of the seeds present in the pod; occasionally, the entire seed-pod is eaten. The ants cause particularly great damage in Krasnodarskiy Kray and the Ukrainian SSR.



Fig. 18. Peanut Pods Damaged by Ants and Wireworms.

Countermeasures. Bran bait treated with sodium arsenate in the amount of two percent by weight of the bait material. Strewn over nesting sites of the ants.

#### Beetle Pentodon idiota

Hrbst. This is a large black beetle reaching 20-24 mm in length. Following their hibernation, these beetles emerge in April-May. In the daytime, they inhabit the top-soil and in the evening they creep over the field, feeding and flying.

Countermeasures. None developed. Of the agrotechnical measures, mention should be made of black fallows, inter-row cultivation, deep fall plowing.

Mice and rats. By destroying the pods of the peanut, they cause considerable damage in the field even before harvesting, as well as during harvesting, drying and storage.

Countermeasures. Bait treated with mouse typhus. Satisfactory results also are produced by bait prepared according to the following prescriptions: 1) 1 kg of ground bread is thoroughly mixed with 50 g of vegetable oil and the same quantity of honey; the resulting paste is treated with white arsenic or barium carbonate (1 part of arsenic per 8 parts of the paste or 1 part of barium carbonate per 6 parts of the paste); 2) well-washed and finely chopped vegetables (carrots, beets) are treated with white arsenic (1 part of the poison per 6 parts of vegetables). The bait is strewn periodically. In storage areas, it is recommended not only to strew poisoned bait but also to deploy saucers with arsenic-poisoned water.

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